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| EXAMINER | |
|---|---|
| MONIKANG, GEORGE C | |
| ART UNIT | PAPER NUMBER |
| 2615 | |

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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

mailroom@bskb.com

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 10/582,863 | KIMURA ET AL. | |
| | Examiner | Art Unit | |
| | George C. Monikang | 2615 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *14 June 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *28* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-28* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☒ Certified copies of the priority documents have been received in Application No. 10/582,863.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *6/14/2006*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

## DETAILED ACTION

### *Claim Rejections - 35 USC § 103*

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1-3, 5-8, 11, 13-16, 18-24, 26-28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Elliot et al, US Patent 5,727,066.

Re Claim 1, Elliott et al discloses the method of acoustic signal reproduction comprising: Processing Step 1 of reducing spatial crosstalk generated, with respect to signals, inputted into the loudspeakers (*abstract; fig. 10: C21*), in a space ranging from the loudspeakers to a control point (*col. 4, lines 49-54: dummy head*); and Processing Step 2 of reducing inter-loudspeaker crosstalk generated inside the casing, with respect to signals having gone through Processing Step 1 (*abstract; fig. 10: C12*). Elliot et al does not explicitly disclose a method of acoustic signal reproduction in a mobile terminal including a plurality of loudspeakers accommodated inside a casing of the mobile terminal as claimed. Official notice is taken that both the concept and advantages of a mobile terminal device with speakers is well known in the art. It would have been obvious to use the method of acoustic signal reproduction in a mobile terminal to reduce crosstalk.

Re Claim 2, Elliott et al discloses a method of acoustic signal reproduction as recited in claim 1, wherein Processing Step 2 includes a summing step to Step-I-

processed signals going into a one of the loudspeakers a reduction signal for reducing sounds inside the casing leaking out from another of the loudspeakers into the one of the loudspeakers (*abstract; fig. 10*).

Re Claim 3, Elliott et al discloses a method of acoustic signal reproduction as recited in claim 2, wherein the reduction signal is generated by processing signals having gone through Processing Step 1, into the other of the loudspeakers (*fig. 10: C21*).

Re Claim 5, Elliott et al discloses a method of acoustic signal reproduction as recited in claim 1, wherein Processing Step 2 includes: a first in-casing direct processing step of processing Step-1-processed signals going into the one of the loudspeakers to obtain a direct component for the one of the loudspeakers (*fig. 10: H11*); a first in-casing crossover processing step of processing Step-l-processed signals going into the other of the loudspeakers to obtain a crossover component for the one of the loudspeakers (*fig. 10: H21*); a first summing step of summing together both post-processed signals to produce a driving signal for driving the one of the loudspeakers (*fig. 10: adder*); a second in-casing direct processing step of processing Step-1-processed signals going into the other of the loudspeakers to obtain a direct component for the other of the loudspeakers (*fig. 10: H22*); a second in-casing crossover processing step of processing Step-1-processed signals going into the one of the loudspeakers to obtain a crossover component for the other of the loudspeakers (*fig. 10: H12*); and a second summing step of summing together both post-processed signals to produce a driving signal for driving the second loudspeakers (*fig. 10: adder*).

Re Claim 6, Elliott et al disclsose a method of acoustic signal reproduction as recited in claim 5, wherein the first in-casing direct processing step is a process according to a transfer function for the driving signal, for driving the other of the loudspeakers as altered by amplifier/loudspeaker characteristics until emitted from the other of the loudspeakers (*fig. 10: H11*), the first in-casing crossover processing step is a process according to a transfer function for the driving signal, for driving the other of the loudspeakers as altered by at least acoustic couplings characteristics until emitted from the one of loudspeakers (*fig. 10: H21*), the second in-casing direct processing step is a process according to a transfer function for the driving signal, for driving the one of loudspeakers as altered by amplifier/loudspeaker characteristics until emitted from the one of loudspeakers (*fig. 10: H22*), the second in-casing crossover processing step is a process according to a transfer function for the driving signal, for driving the one of loudspeakers, as altered by at least acoustic couplings characteristics until emitted from the other of loudspeakers (*fig. 10: H12*).

Re Claim 7, Elliott et al disclose a method of acoustic signal reproduction as recited in claim 5, wherein Processing Step 2 includes a post-processing step further processing one of the summed signals so that loudspeaker's emission signals emitted from the one of the loudspeakers are made approximately coincident with the amplitude/phase of Pocessing-Step-1-processed signals to the one of the loudspeakers (*fig. 10: Delay, reconstruction filter etc..)*.

Re Claim 8, Elliott et al discloses a method of acoustic signal reproduction as recited in claim 5, wherein Processing Step 2 includes a pre-processing step

processing, posterior to Processing Step 1 and prior to Processing Step 2, Processing-Step-l-processed signals to the one of the loudspeakers so that the-one-of-the-loudspeakers' emission signals are made approximately coincident with the amplitude/phase of Processing-Step- 1-processed signals to the one of the loudspeakers (*fig. 10: Delay, reconstruction filter etc..)*.

Re Claim 11, Elliott et al discloses a method of acoustic signal reproduction as recited in claim 3, wherein correlation between the Processing-Step-l-processed signals to the other of the loudspeakers and the Processing-Step-1-processed signals to the one loudspeaker is obtained on a frequency component basis, so that processing Processing-Step-1-processed signals to the other of the loudspeakers is performed according to the correlation (*fig. 10: C21 & C12*).

Re Claim 13, Elliott et al disclose a method of acoustic signal reproduction as recited in claim 5, wherein one in-casing direct processing step and another in-casing direct processing step are approximately in common with one in-casing crossover processing step and another in-casing crossover processing step, respectively (*fig. 10: C11, C21 & C12, C22*).

Claim 14 has been analyzed and rejected according to claim 1.

Claim 15 has been analyzed and rejected according to claim 2.

Claim 16 has been analyzed and rejected according to claim 3.

Claim 18 has been analyzed and rejected according to claim 5.

Claim 19 has been analyzed and rejected according to claim 6.

Claim 20 has been analyzed and rejected according to claim 7.

Claim 21 has been analyzed and rejected according to claim 8.

Claim 22 has been analyzed and rejected according to claim 9.

Claim 23 has been analyzed and rejected according to claim 10.

Claim 24 has been analyzed and rejected according to claim 11.

Claim 26 has been analyzed and rejected according to claim 13.

Re Claim 27, Elliott et al discloses a method of acoustic signal reproduction in a mobile terminal including a quantity N of loudspeakers accommodated inside a casing of the mobile terminal (*fig. 1*), the acoustic-signal reproduction method characterized in that given that a loudspeaker's emission signal Si emitted from an i-th loudspeaker is expressed by the following equation, using a matrix H having a transfer function Hij for a driving signal Sdi, for driving the i-th loudspeaker, as altered by at least in-casing acoustic couplings until emitted from a j-th loudspeaker, and a transfer function Hii for a driving signal, for driving the i-th loudspeaker, as altered by at least either amplifier or loudspeaker characteristics until emitted from the i-th loudspeaker (*col. 4, lines 18-31; col. 5, eq. 1*),

Equation 1

$$\begin{matrix} S1 \\ S2 \\ \dots \\ SN \end{matrix} = HSd = \begin{matrix} H11 & H21 & \dots & HN1 \\ H12 & H22 & \dots & HN2 \\ \dots & & & \dots \\ H1N & H2N & \dots & HNN \end{matrix} \begin{matrix} Sd1 \\ Sd2 \\ \dots \\ Sdn \end{matrix}$$

then the driving signal Sdi for the i-th loudspeaker is generated by performing, on a signal Yi corresponding to the i-th loudspeaker, the signal having passed through a

processing step of reducing in input signals spatial crosstalk generating in a space ranging from the loudspeakers to a control point, a process according to the following filter characteristic G base on cofactors Qij of components (i,j) of the matrix H (*col. 4, lines 18-31; col. 5, eqs. 2, 3*).

Equation 2

$$\begin{matrix} Sd1 \\ Sd2 \\ \dots \\ Sdn \end{matrix} = G \begin{matrix} Y1 \\ Y2 \\ \dots \\ YN \end{matrix} \text{ where } G = a \begin{matrix} Q11 & Q12 & \dots & Q1N \\ Q21 & Q22 & \dots & Q2N \\ \dots & & & \\ QN1 & QN2 & \dots & QNN \end{matrix}$$

Claim 28 has been analyzed and rejected according to claim 27.

### *Claim Rejections - 35 USC § 103*

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

3. Claims 4, 10 & 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Elliott et al as applied to claim 3 above, and further in view of Katayama et al, US Patent 6,546,105 B1.

Re Claim 4, Elliott et al discloses a method of acoustic signal reproduction as recited in claim 3, but fails to disclose wherein the processing of the Step-1-processed signals going into the other of the loudspeakers is performed according to a characteristic obtained by: dividing a transfer function for a driving signal, for driving the other of the loudspeakers, as altered by at least acoustic couplings until emitted from the one of the loudspeakers, by a transfer function for a driving signal, for driving the one of the loudspeakers, as altered by at least amplifier/loudspeaker characteristics until emitted from the one of the loudspeakers; and reversing the arithmetic sign. However, Katayama et al does (*fig. 5: 12; col. 14, line 66 though col. 15, line 9*).

Taking the combined teachings of Elliott et al and Katayama et al as a whole, one skilled in the art would have found it obvious too modify the d of acoustic signal reproduction of Elliott et al with wherein the processing of the Step-1-processed signals going into the other of the loudspeakers is performed according to a characteristic obtained by: dividing a transfer function for a driving signal, for driving the other of the loudspeakers, as altered by at least acoustic couplings until emitted from the one of the loudspeakers, by a transfer function for a driving signal, for driving the one of the loudspeakers, as altered by at least amplifier/loudspeaker characteristics until emitted from the one of the loudspeakers; and reversing the arithmetic sign as taught in

Katayama et al (*fig. 5: 12; col. 14, line 66 though col. 15, line 9*) for computing filter coefficients.

Re Claim 10, the combined teachings of Elliott et al and Katayama et al disclose a method of acoustic signal reproduction as recited in claim 4, wherein processing Processing-Step-I-processed signals to the other of the loudspeakers is performed according to a characteristic obtained by passing signals through a low-pass filter having the transfer function (*Elliott et al, fig. 10: LPF*).

Claim 17 has been analyzed and rejected according to claim 4.

Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Elliott et al as applied to claim 3 above, and further in view of Ueno et al, US Patent 5,960,390.

Re Claim 9, Elliott et al discloses a method for acoustic signal reproduction as recited in claim 3, but fails to disclose wherein processing Processing-Step-I-processed signals to the other of the loudspeakers is performed on a subband basis of the Processing-Step-1-processed signals to the other of the loudspeakers. However, Ueno et al does (*fig. 5: 101*).

Taking the combined teachings of Elliott et al and Ueno et al as a whole, one skilled in the art would have found it obvious to modify the method for acoustic signal reproduction of Elliott et al with wherein processing Processing-Step-I-processed signals to the other of the loudspeakers is performed on a subband basis of the Processing-Step-1-processed signals to the other of the loudspeakers as taught in Ueno et al (*fig. 5:*

*101*) to break the signals into a number of different frequency bands and process each one independently.

Claims 12 & 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Elliott et al as applied to claim 3 above, in view of Baumgarte et al, US Patent Pub. 2003/0219130 A1, and further in view of Nakayama, US Patent 4,700,389.

Re Claim 12, Elliott et al discloses a method of acoustic signal reproduction as recited in claims 3, but fails to disclose wherein processing Processing-Step-1-processed signals to the other of the loudspeakers is performed according to a characteristic obtained by multiplying the Processing-Step-1-processed signals to the other of the loudspeakers, by a scalar value less than one. However, Baumgarte et al does (*para 0047*).

The combined teachings of Elliott et al and Baumgarte et al fail to disclose reversing the arithmetic sign, however, Nakayama does (*fig. 2: 14b; col. 8, line 48 through col. 9, line 7*).

The combined teachings of Elliott et al, Baumgarte et al and Nakayama as a whole, one skilled in the art would have found it obvious to modify the method of acoustic signal reproduction according to Elliott et al with wherein processing Processing-Step-1-processed signals to the other of the loudspeakers is performed according to a characteristic obtained by multiplying the Processing-Step-1-processed signals to the other of the loudspeakers, by a scalar value less than one as taught in Baumgarte et al (*para 0047*) with reversing the arithmetic sign as taught in Nakayama

(*fig. 2: 14b; col. 8, line 48 through col. 9, line 7*) to reduce the perceptual similarity of the signals and effective to produce perceived natural enlargement of the sound field.

Claim 25 has been analyzed and rejected according to claim 12.

## Contact

Any inquiry concerning this communication or earlier communications from the examiner should be directed to George C. Monikang whose telephone number is 571-270-1190. The examiner can normally be reached on M-F. alt Fri. Off 7:30am-5:00pm (est).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Chin Vivian can be reached on 571-272-7848. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

George Monikang

4/29/2007

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